Excelsior
MINING CORP

Underground Injection Control Permit Meeting

Gunnison Copper Project

February 9, 2017

AGENDA

Excelsior MINING CORP

Provide responses to comments received from EPA via email from Nancy Rumrill dated Jan' 23, 2017

1. Pilot-scale operations prior to commercial ISR operations.
2. Inclusion of saturated basin fill and the upper portion of the sulfide in the aquifer exemption (AE) zone.
3. Observation/monitoring well placement at the southern and western perimeter of Area of Review (AOR); re-evaluate AOR and AE at a later date.
4. Other monitoring: 30-day rolling average for over-extraction to injection volume and use of intermediate monitoring wells.

Any additional technical issues from Excelsior's comment responses submitted Dec' 22, 2016?

Comment 1: Pilot Scale Testing

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- Excelsior previously provided responses to EPA on the Pilot study. In addition, Excelsior proposes:
- A groundwater model validation report after 1 year of operations which will include:
  - Actual operations data input to the model
  - Predictions of current groundwater levels
  - Comparison to observation data as an evaluation of model predictions
- Report to be submitted within 90 days at end of mining year 1
- Report will be periodically updated according to UIC/APP Permits

Comment 2: Aquifer Exemption

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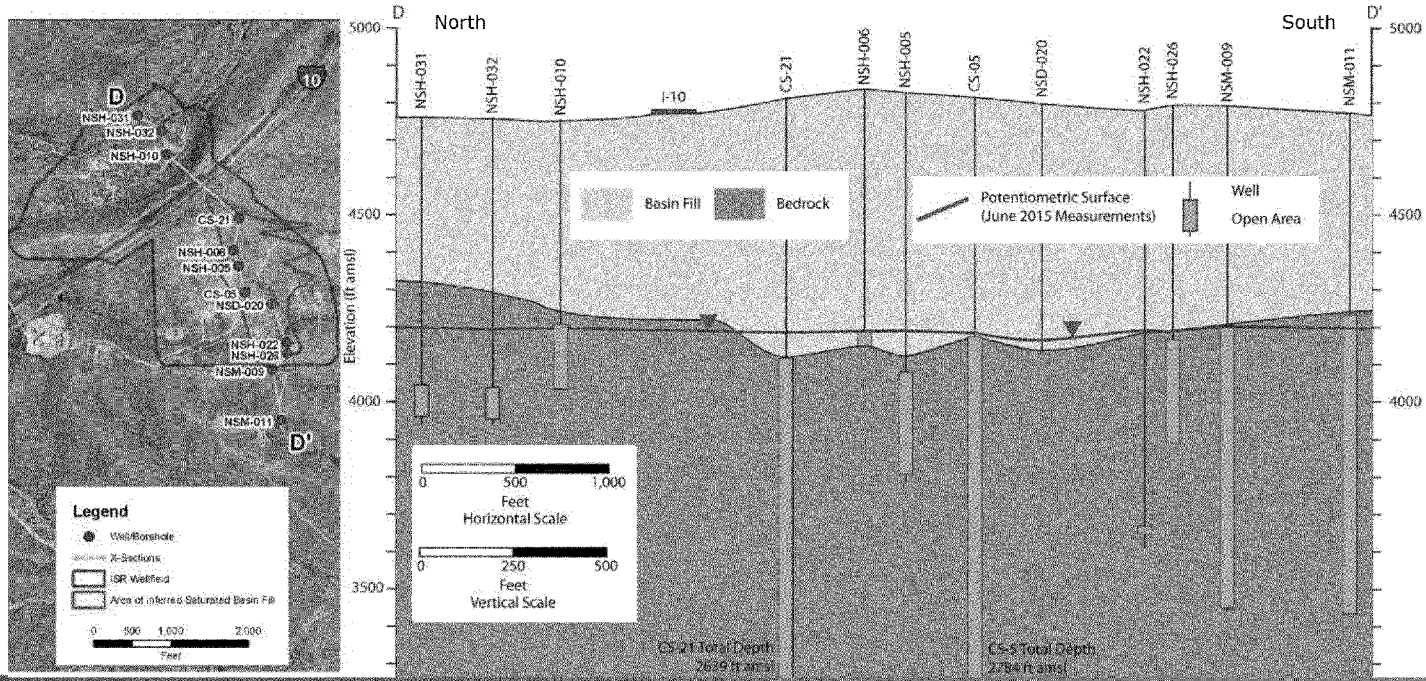
Proposal: <u>Upper boundary</u> to be defined as the top of the bedrock or any basin fill within the mining area that is below 4185’ elevation (approximate water table elevation of saturated basin fill measured in late 2016)



Comment 2: Aquifer Exemption

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Proposal: Lower boundary to be defined as the top of the sulfide zone.

Sulfide zone does not meet the definition of a USDW

- 1a--supplies any public water system ***[DOES NOT]***; or
- 1b--which contains a sufficient quantity of groundwater to supply a public water system ***[DOES NOT – SEE NSH-25]*** AND

  A--currently supplies drinking water for human consumption ***[DOES NOT]***; or

  B--contains fewer than 10,000 mg/l TDS ***[DOES]***; and
- 2--is not an exempted aquifer ***[NA]***

Comment 2: Aquifer Exemption

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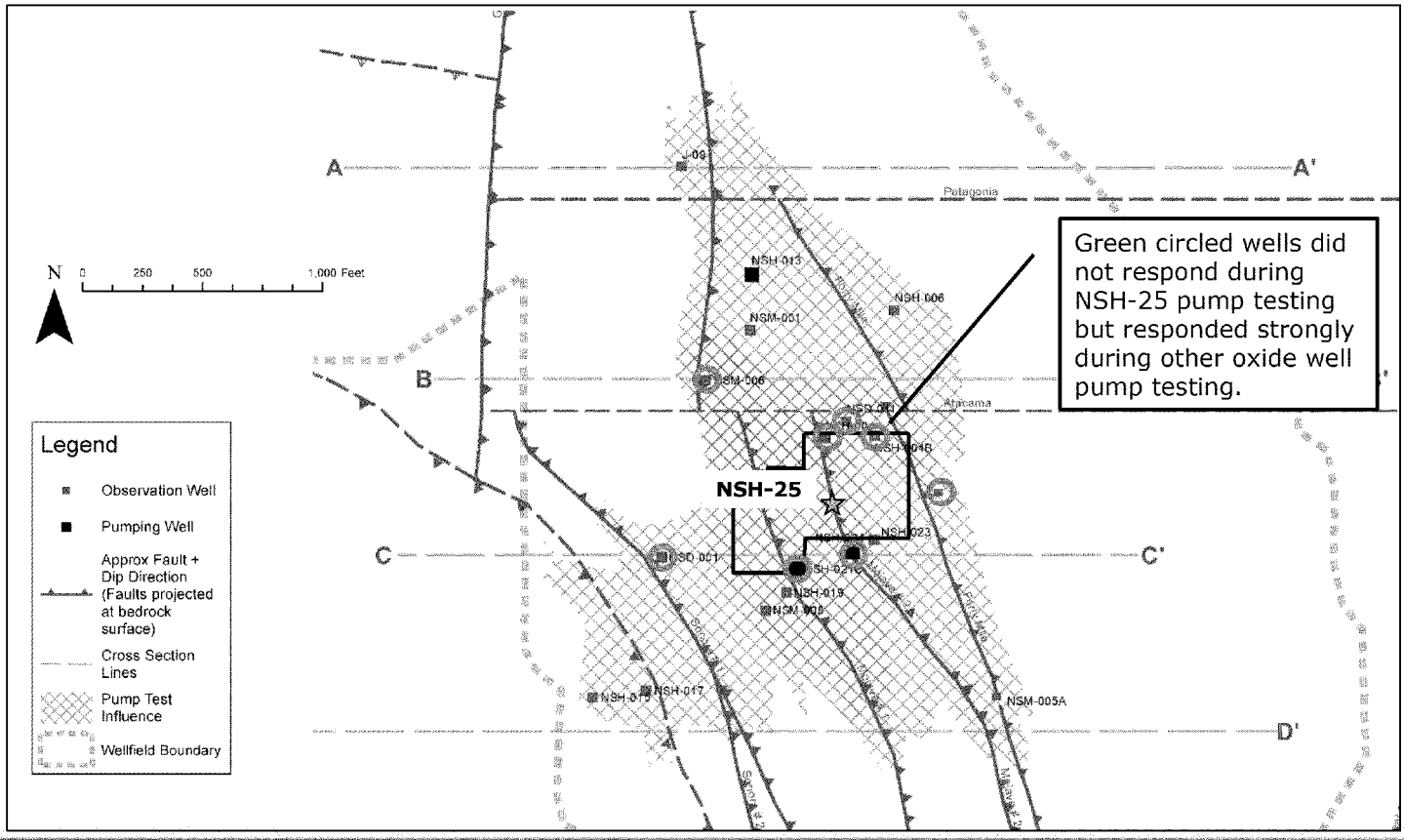
Testing at well NSH-25:

- Located in center of mining block 1
- Screened 1480 to 1551 in sulfide zone
- Tested at 3 to 6 gpm for 3 hours
- Rapid drawdown of over 200 feet within minutes of pump start
- T value: 8.5 ft^2/day; K value: 0.07 ft/day

NSH-25 (Sulfide Zone)



Comment 3: Obs/MW Locations at S and W of AOR

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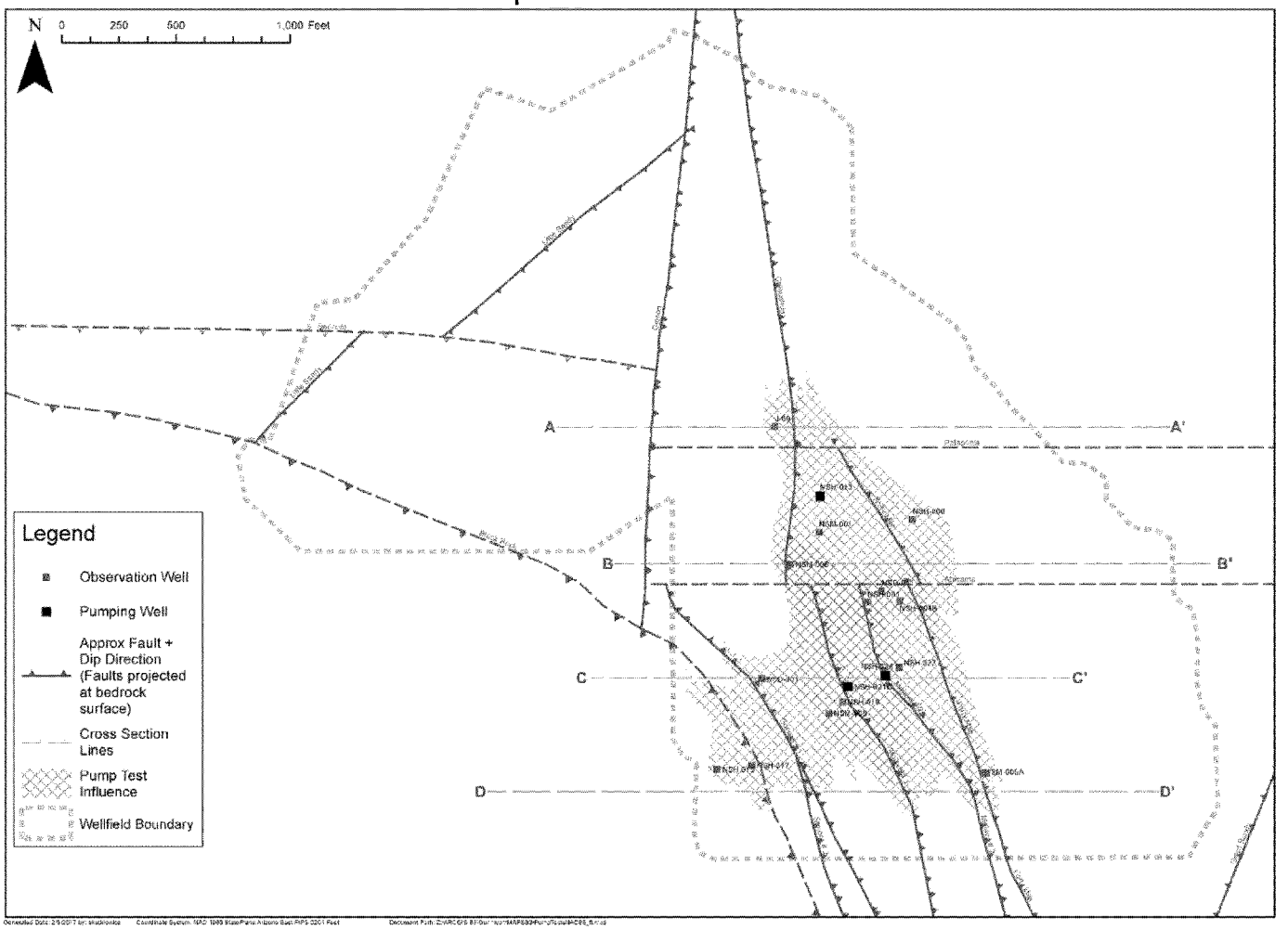
Excelsior wishes to keep the AOR in the southern and western boundaries as per the application.

- Excelsior proposes a network of Intermediate Monitoring Wells (IMWs) within the AOR.
- These are to be located in an "inner ring" and "outer ring" around the active mining areas.
- The outer ring includes wells to the south and west of the Stage 1 mining blocks.
- Excelsior proposes that IMWs be monitored continuously for specific conductivity and water levels.
- If alert levels show an increasing trend in the outer ring, operations will be adjusted to reverse that trend and/or downgradient hydraulic control wells will be initiated.
- Cross sections show that the IMWs intersect the major structures.

Pump Test Area of Influence



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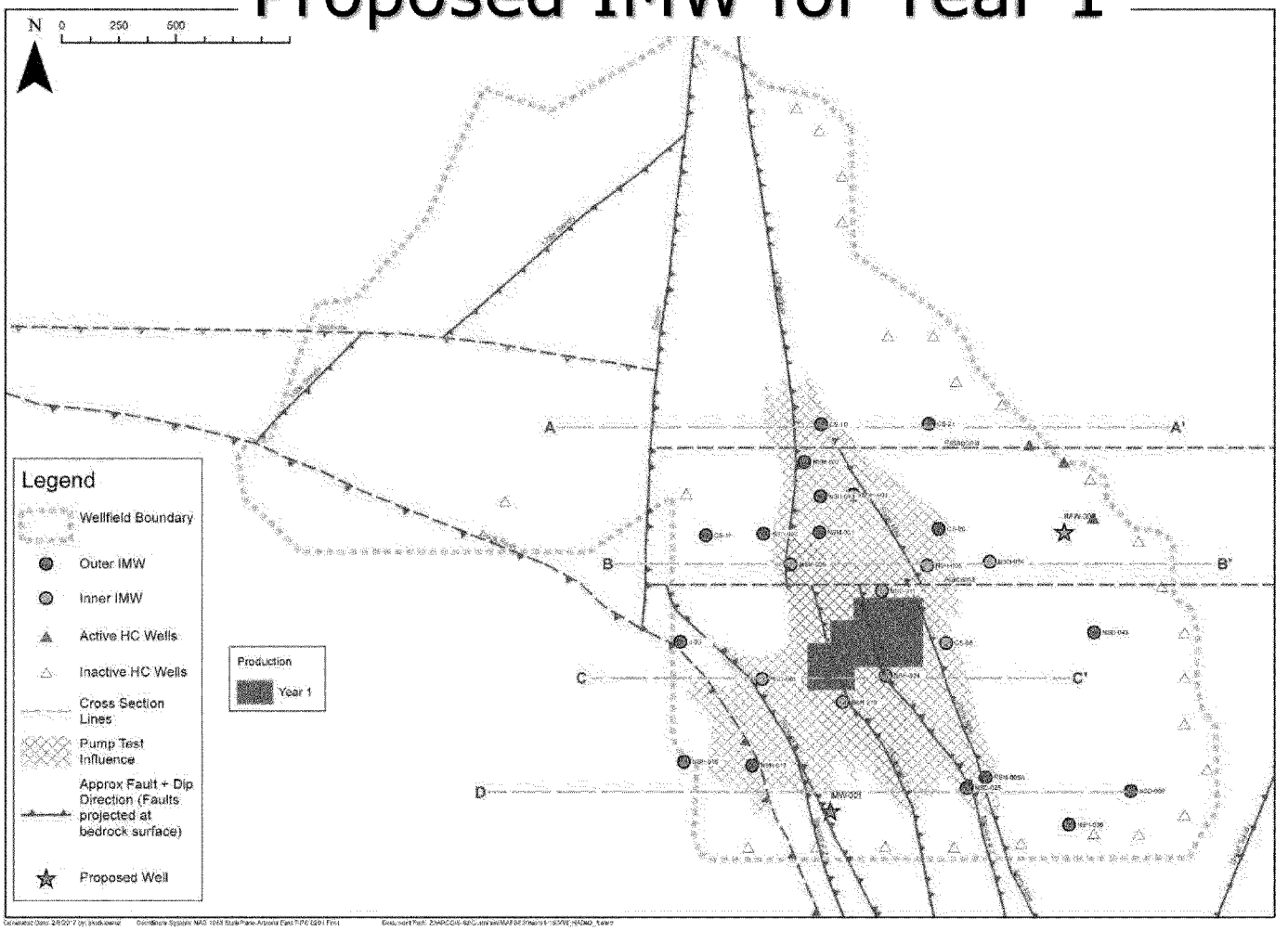
Proposed IMW for Year 1



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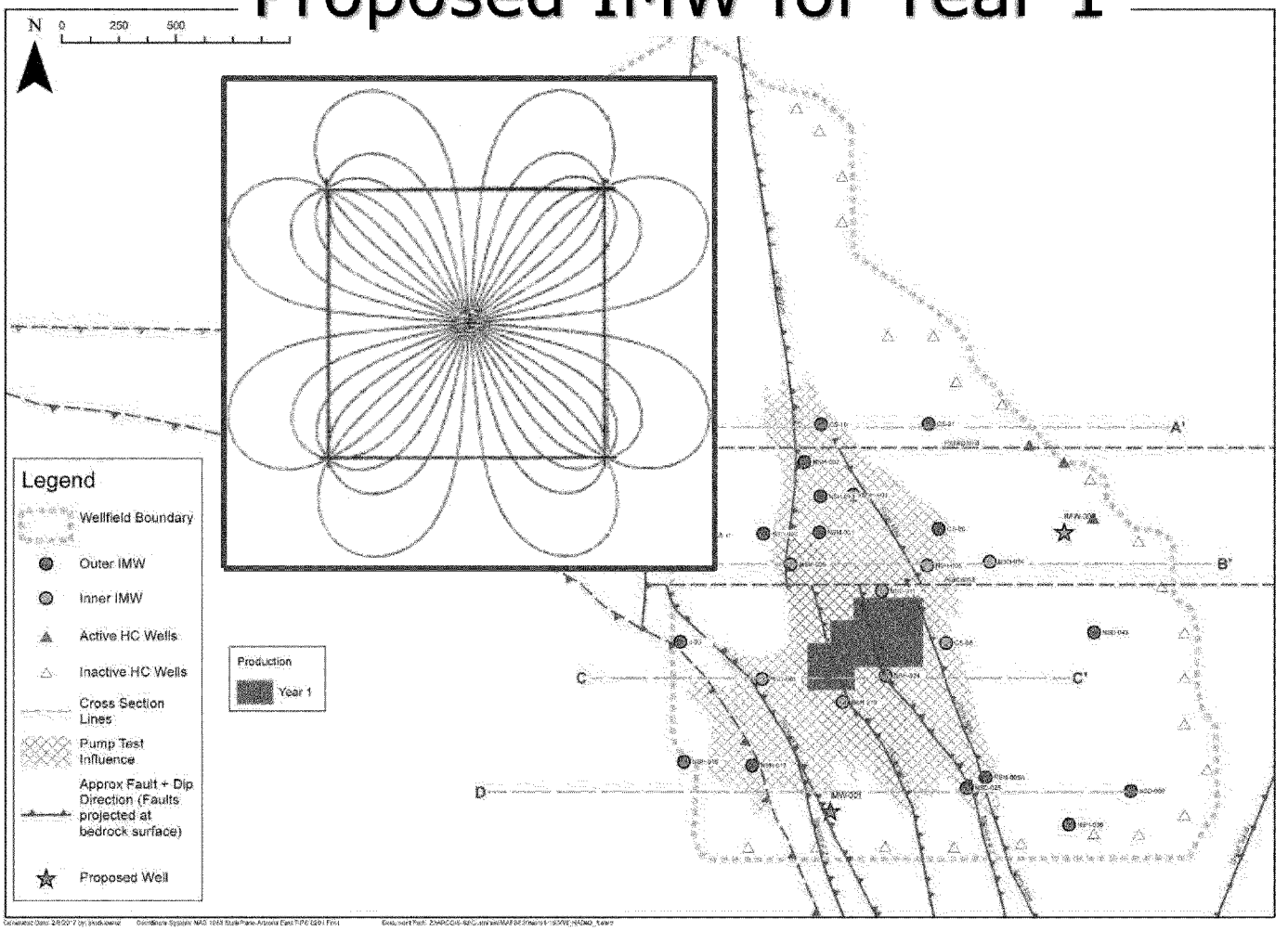
Proposed IMW for Year 1



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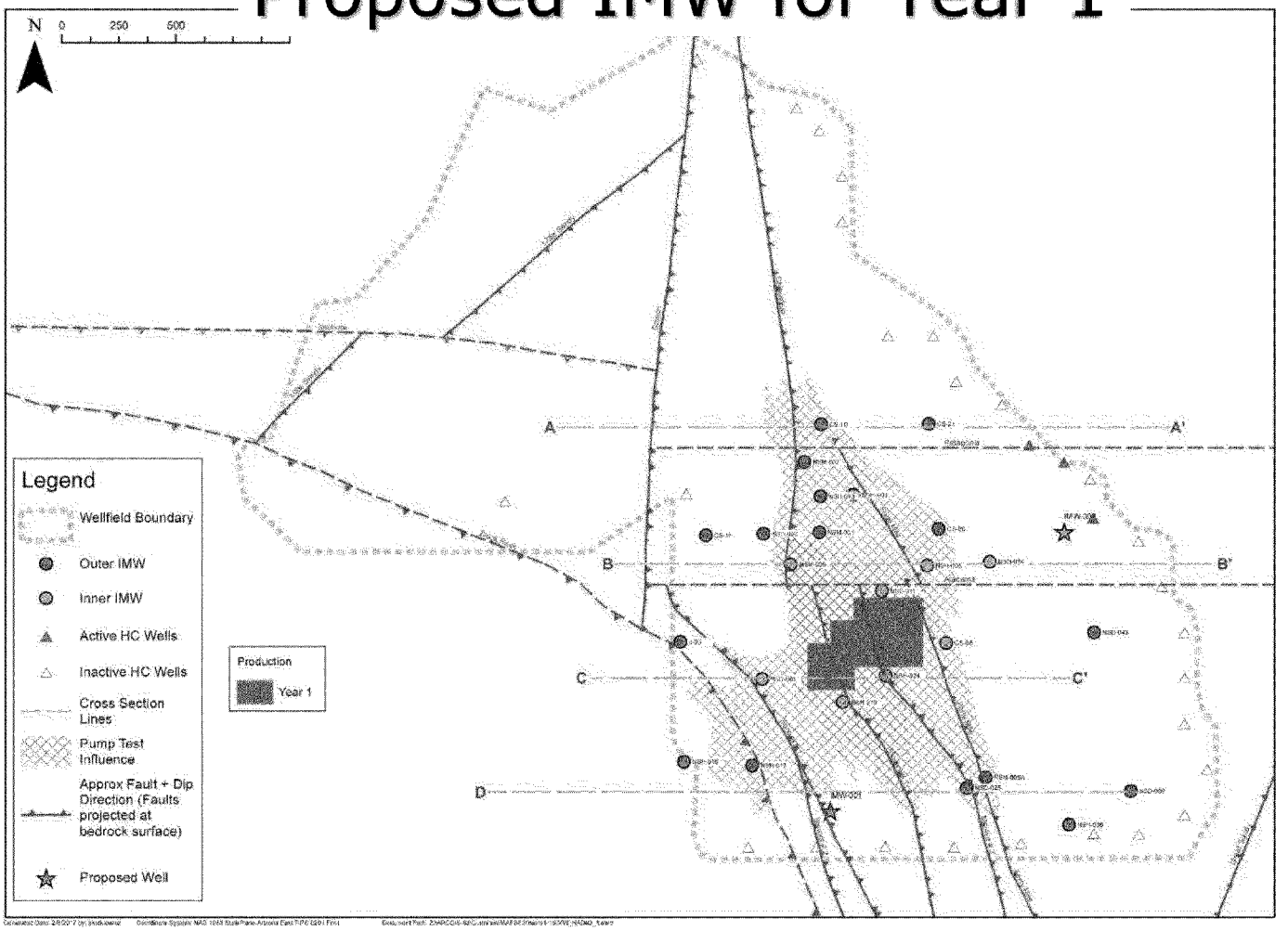
Proposed IMW for Year 1



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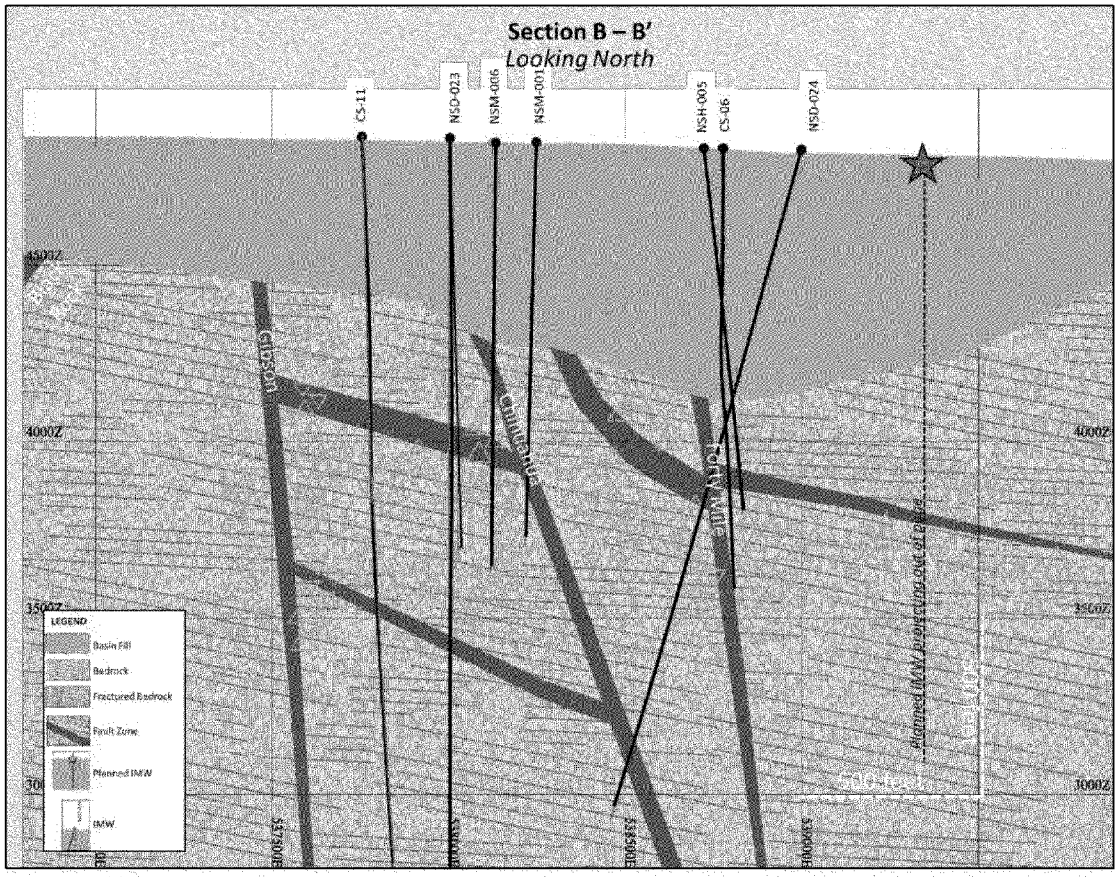
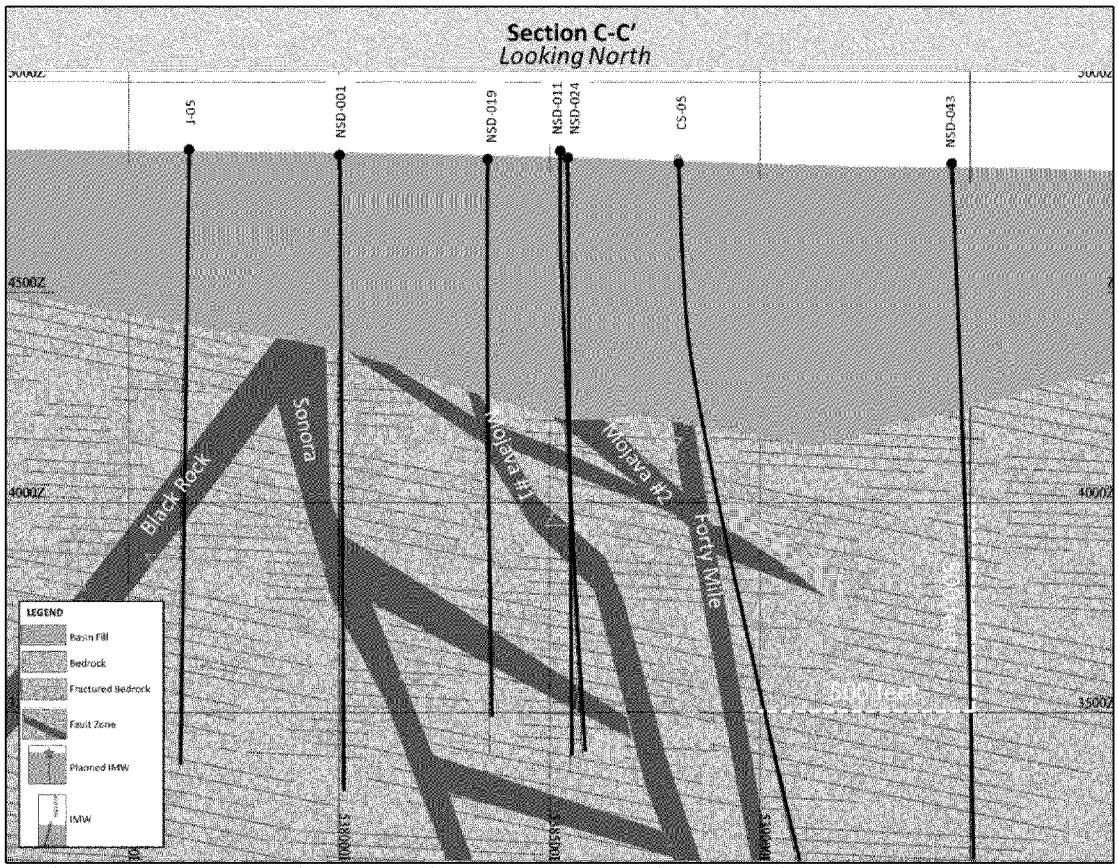
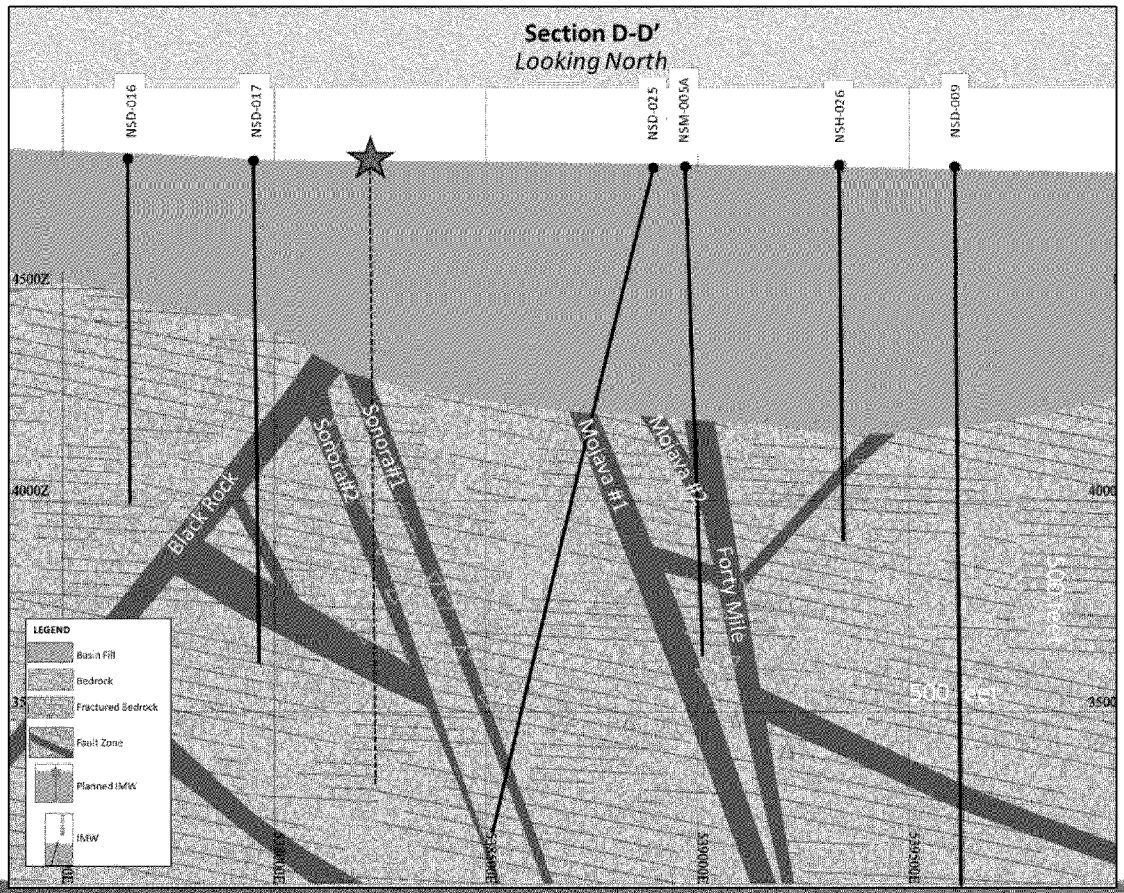
Cross Section B-B′



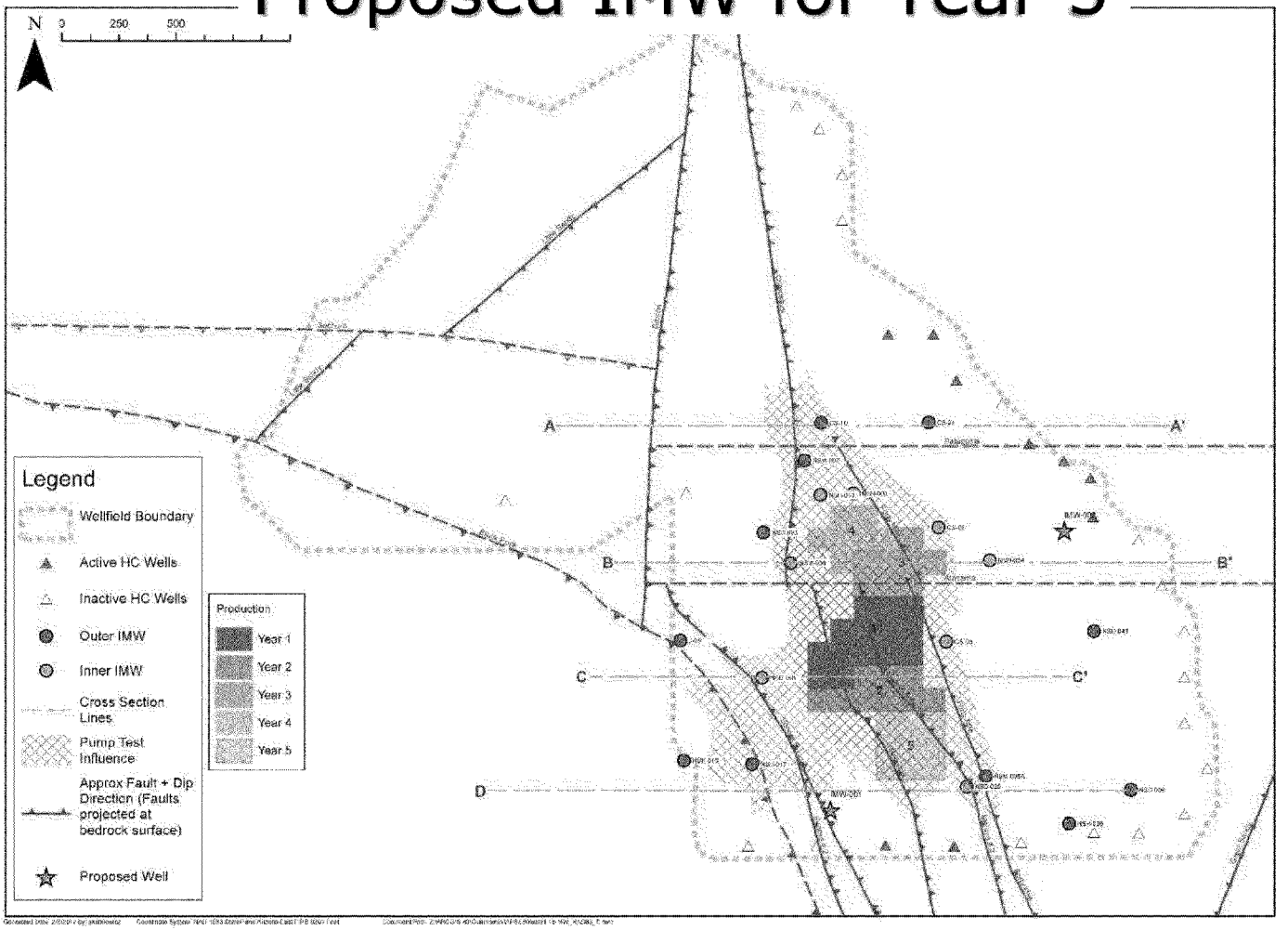
Cross Section C-C'



Cross Section D-D'



Proposed IMW for Year 5



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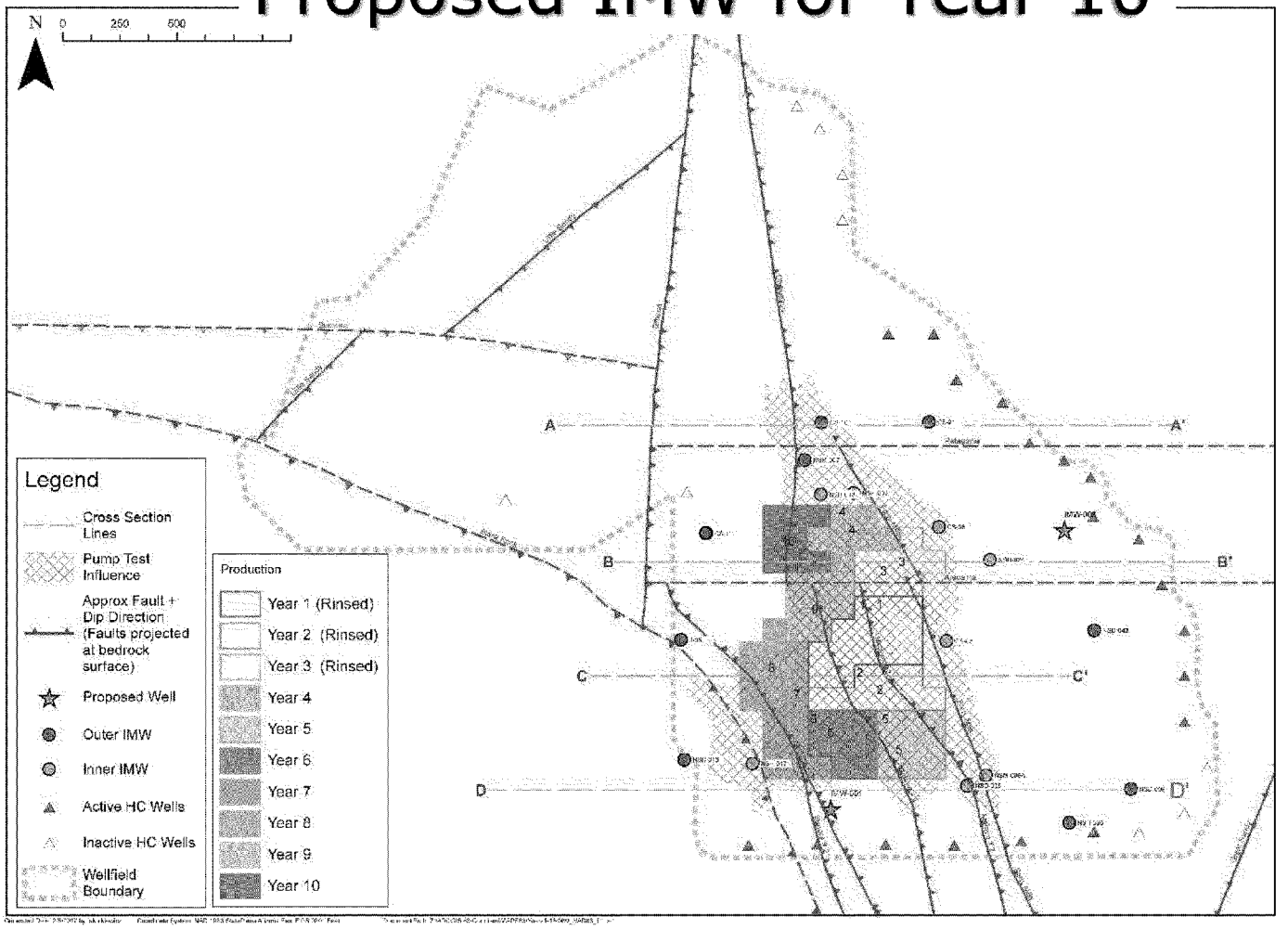
Proposed IMW for Year 10



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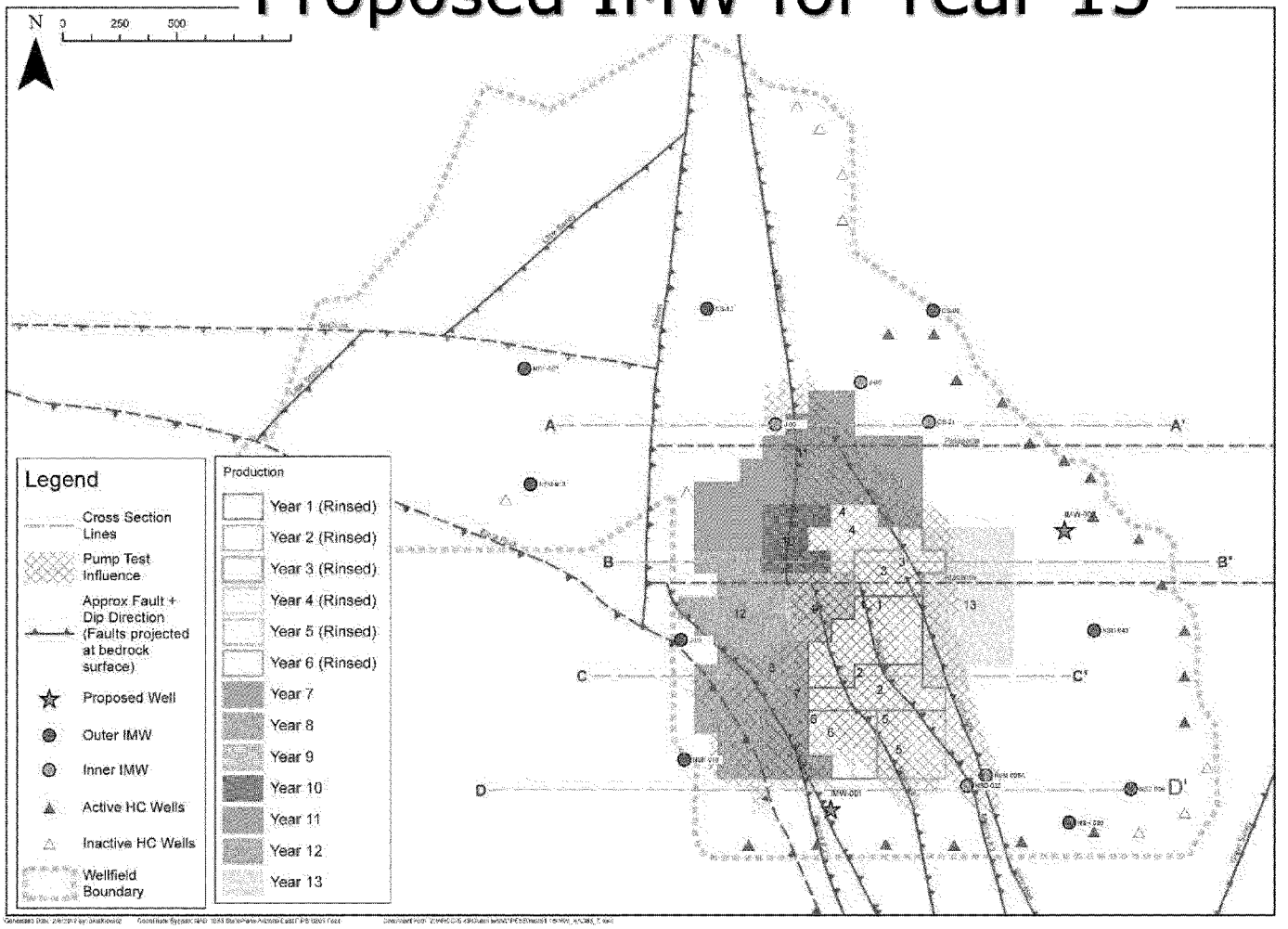
Proposed IMW for Year 13



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Summary IMWs

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- Inner and outer rings of existing wells plus two new wells proposed through Stage 2
- Expanding outward as production expands
- Monitored for specific conductivity & water level
- Increasing trend above alert levels in outer wells:
  - Adjust operations to reverse the trend (pull back solutions) and/or
  - Install interceptor HC wells (if not already installed)
  - Adjust pumping in HC wells if needed
- IMWs inside an active mining area will be abandoned prior to mining in that block
- Rinsed areas will have IMW's as needed (re-purposed recovery or injection wells)

Comment 4: 30-Day Rolling Average

Excelsior MINING CORP

- See Responses to EPA comments 8, 59, 99, 102, 111
- HC system around perimeter is primary control
- HC will provide net withdrawal, and is designed to demonstrate and maintain inward hydraulic gradients
- Monitoring of gradients at HC will be done daily and reported weekly
- Groundwater velocities are very slow (median particle velocity is 0.08 ft/day)
- IMWs are around mining blocks to monitor solution migration inside HC boundary, and operations will be adjusted to pull back solutions or increase HC control

Closure Strategy & Bonding

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Discussions:

1. In the event of company failure, what to do about, and how to bond for, solutions that had migrated from the mining block?
2. What about solutions migrating from active mining areas back into already rinsed or closed mining areas?
3. Adequacy/purpose of 1 in 10 post rinse sampling
4. What about the potential for post-rinse or post-closure rebound, how will it be monitored?

Closure Strategy

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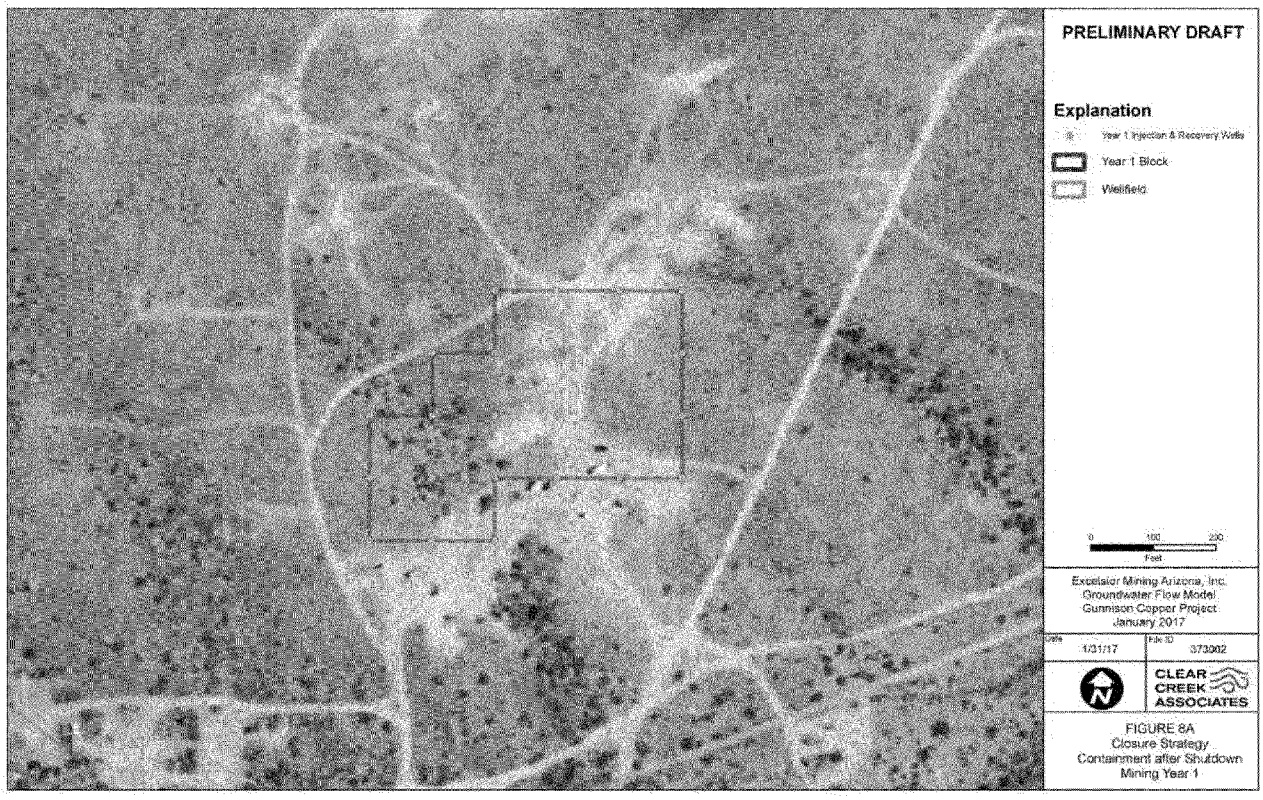
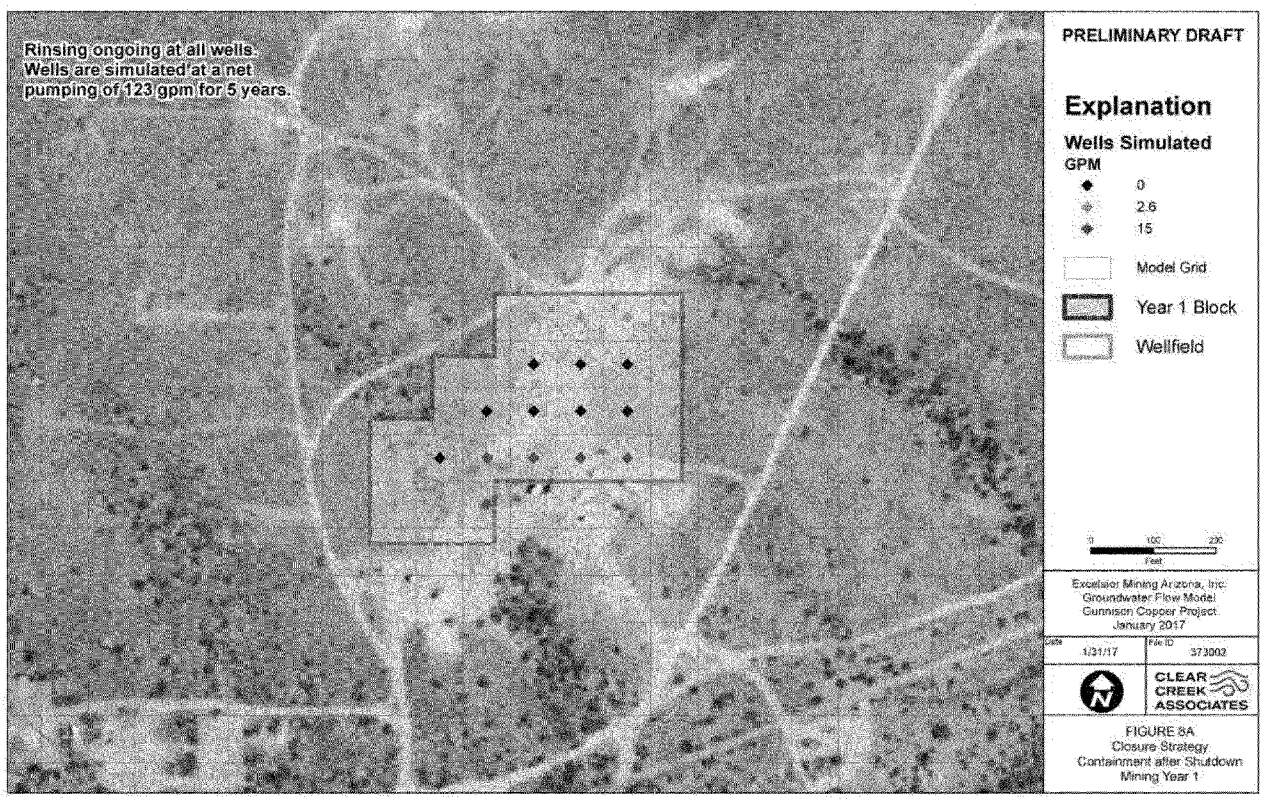
In the event of company failure, what to do about, and how to bond for, solutions that had migrated from the mining block?

A. Rinse per mine plan all active mining areas
B. Maintain HC pumping and adjust if needed
C. Over-pump exterior wells of the mining blocks to draw excursions back to the blocks (if needed)
D. Complete the process within 5 years following termination of mining

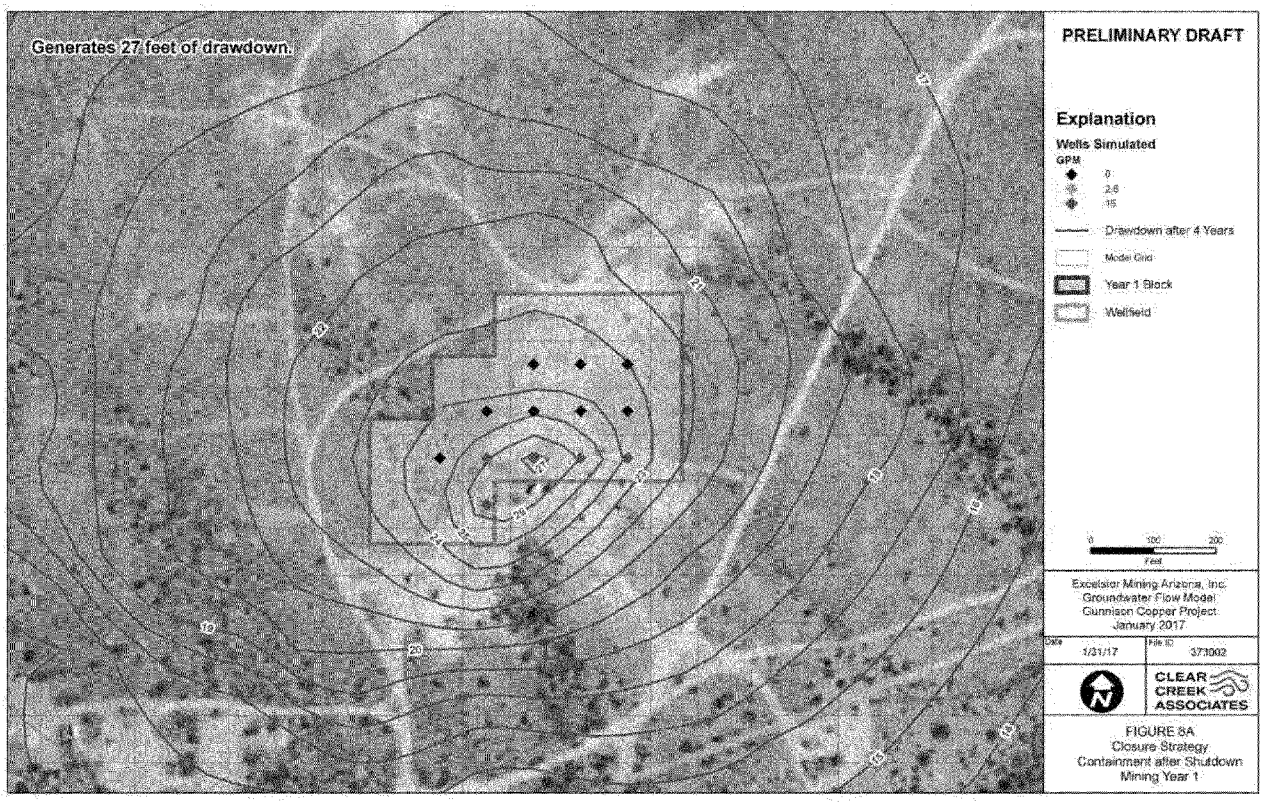
Year 1 Closure Scenario



Year 1 Closure Scenario

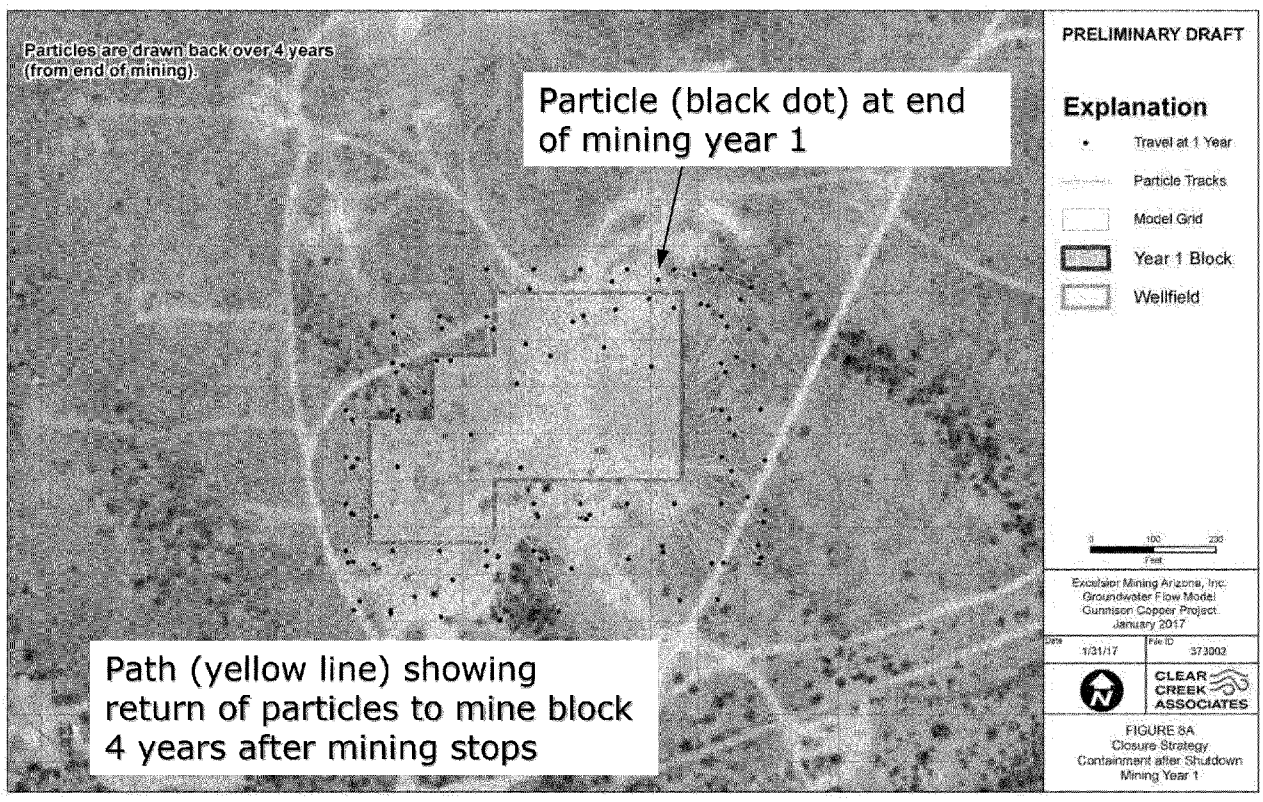


Year 1 Closure Scenario



Year 1 Closure Scenario

Excelsior MINING CORP



Year 5 Closure Scenario

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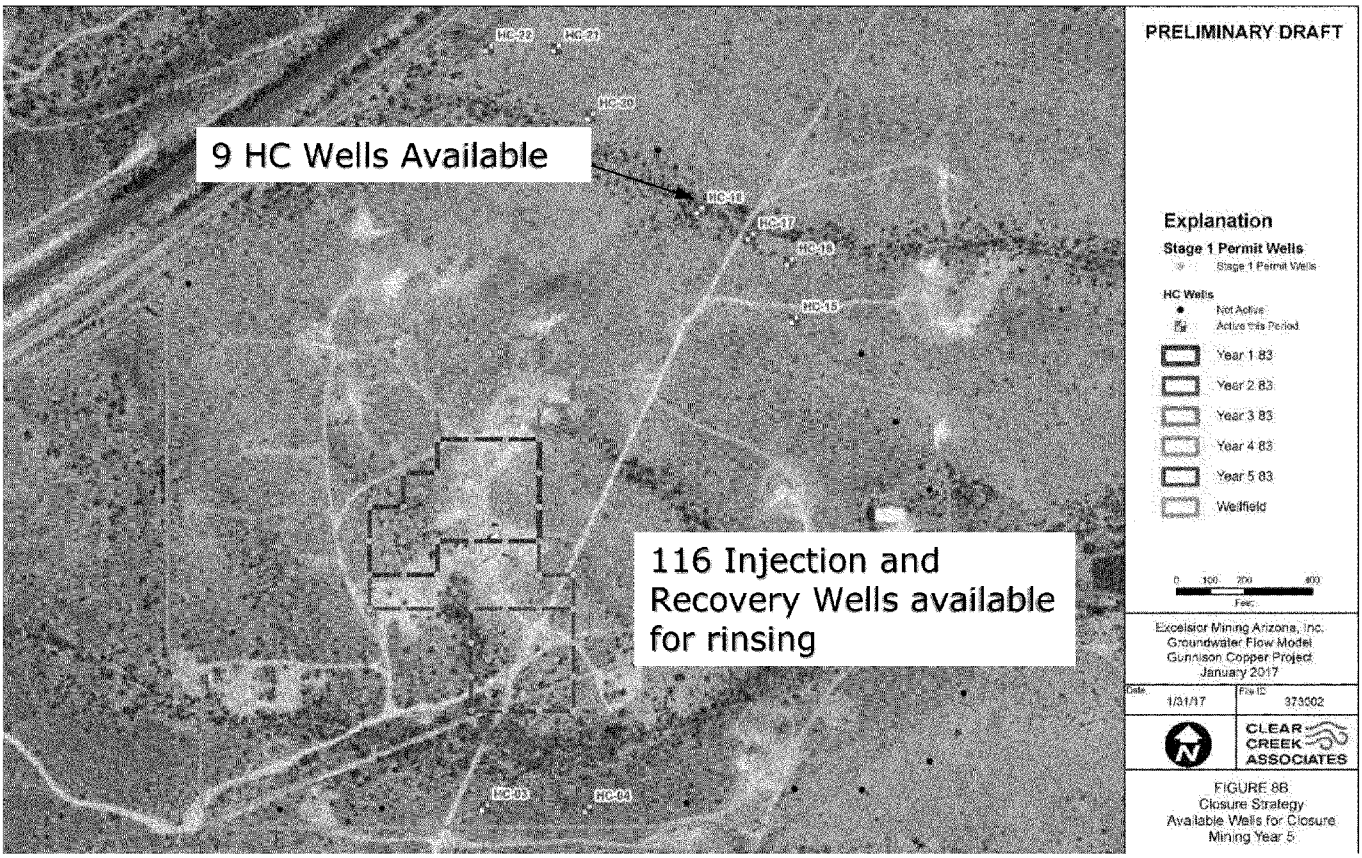
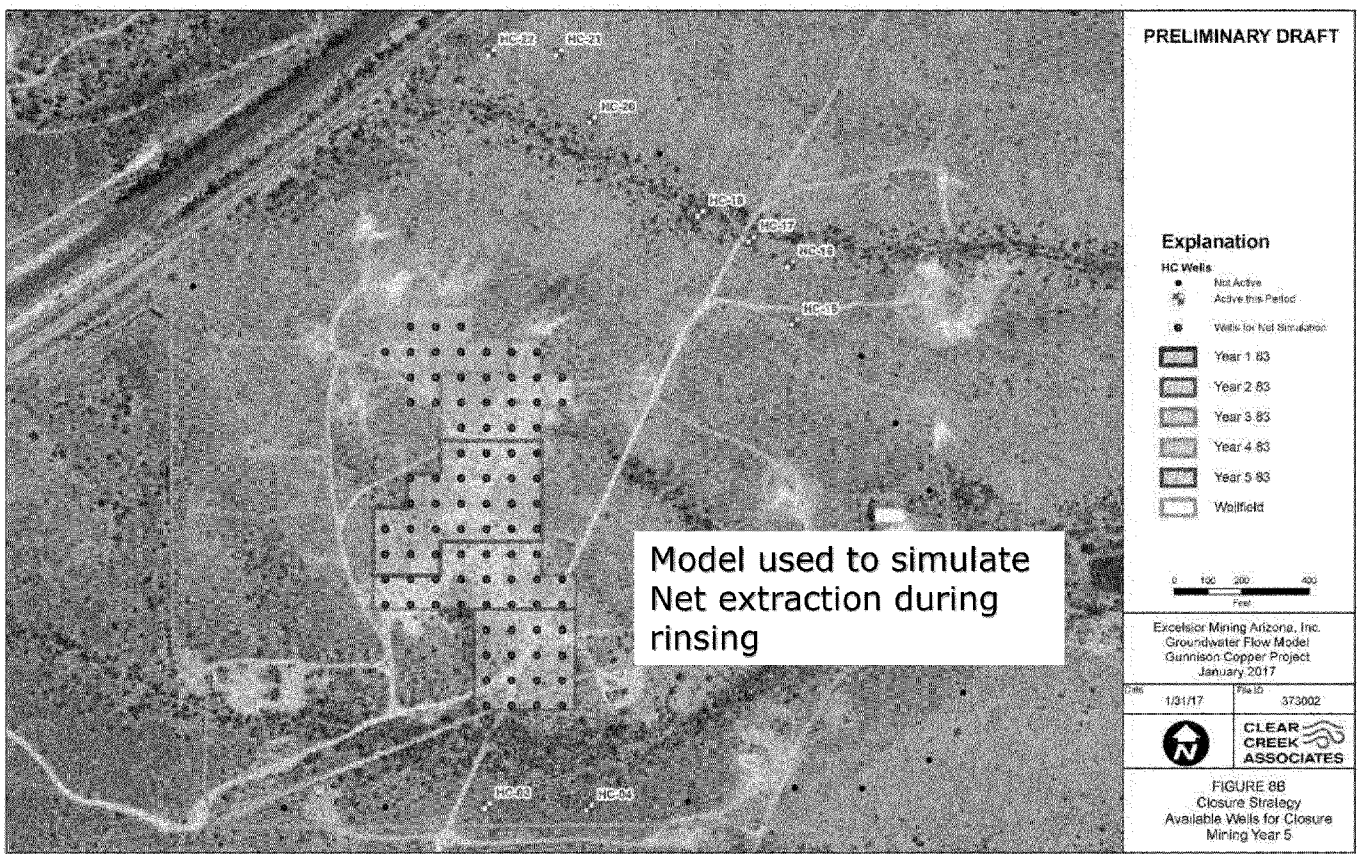


Year 5 Closure Scenario



Model used to simulate Net extraction during rinsing

Year 5 Closure Scenario

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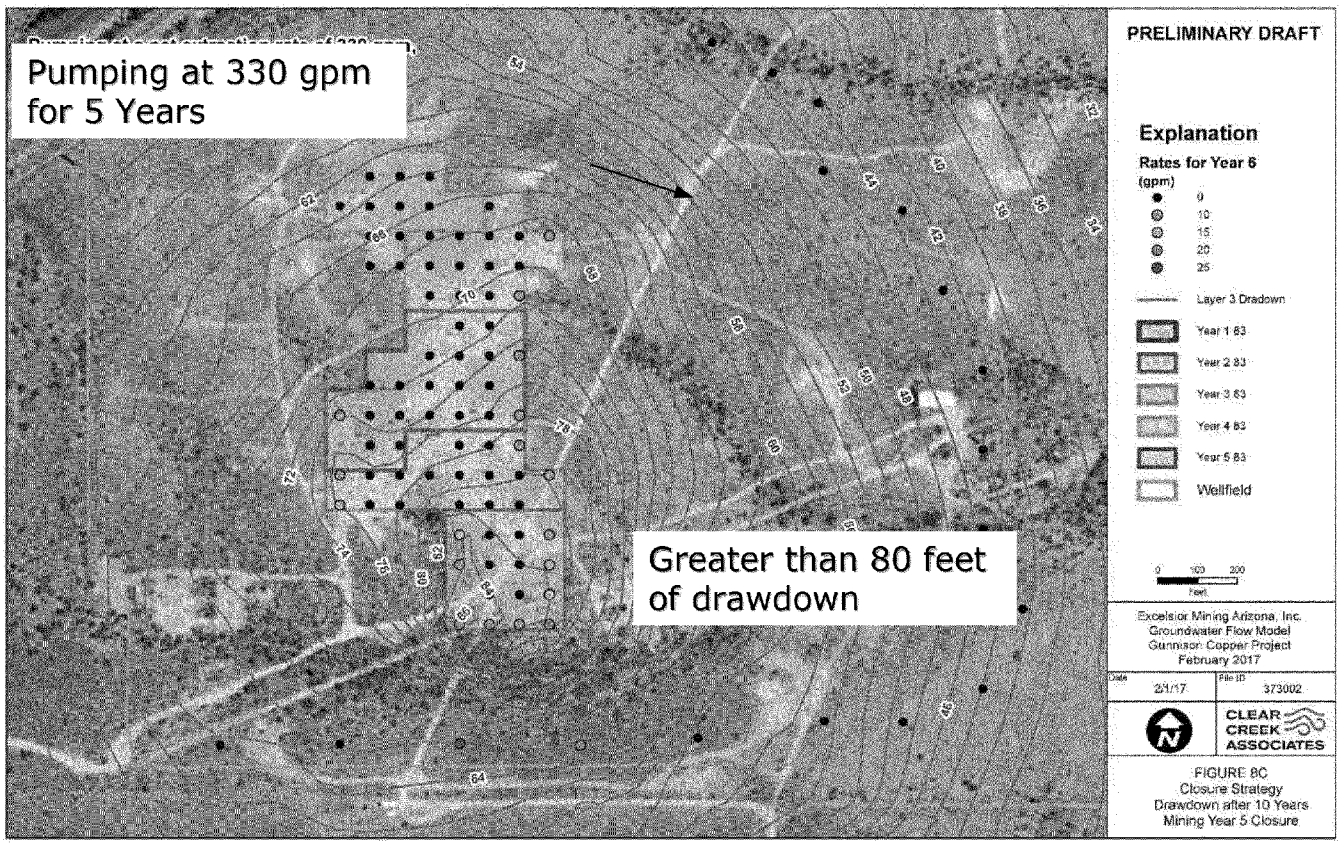
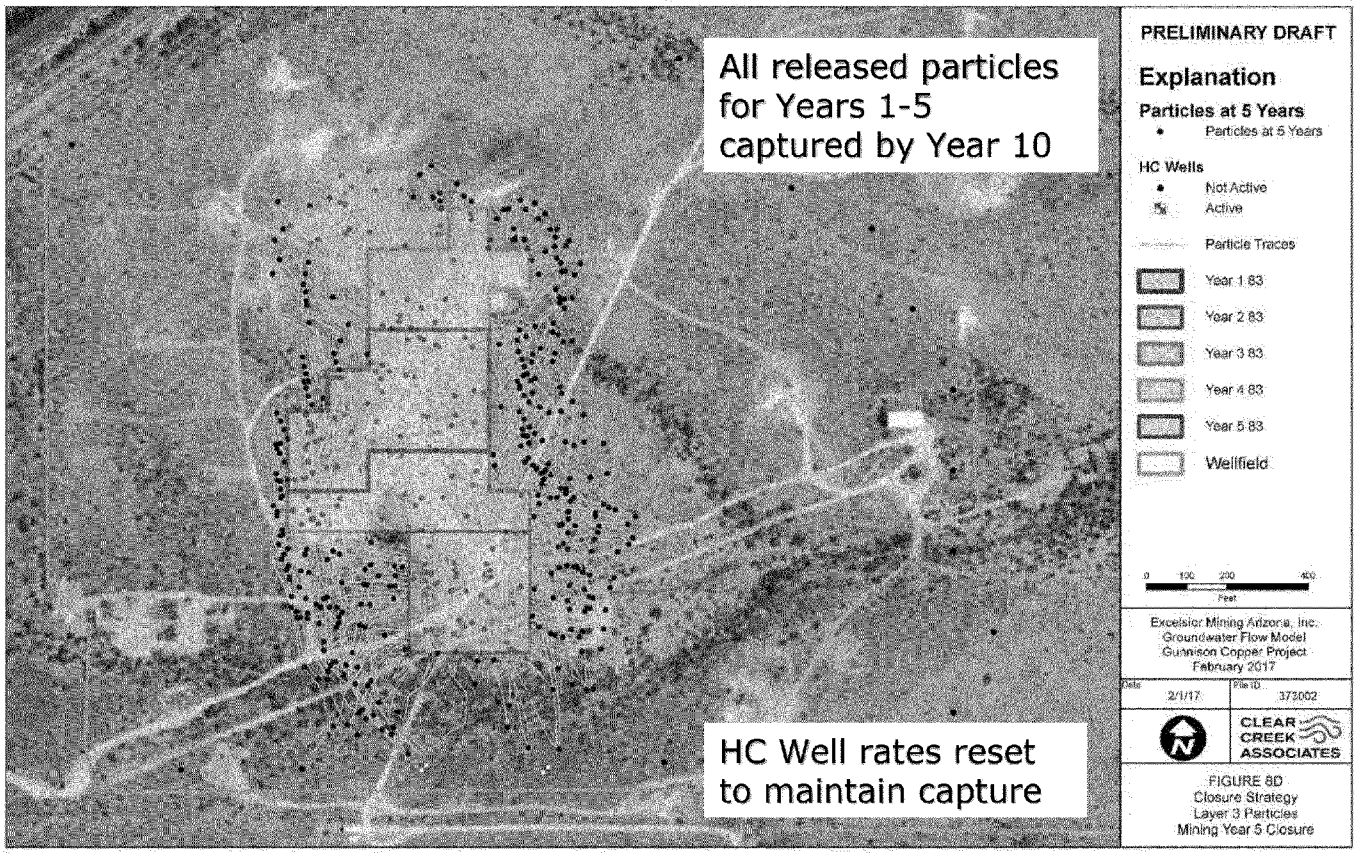


Year 5 Closure Scenario

Excelsior MINING CORP



Comment 43/EPA Comment 4

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Closure/Post Closure Strategy:

- Retain 1 in 10 injection and recovery wells post-rinse, **through life of mine**
- Sample retained wells at the end of rinsing a mining block to verify GW meets AWQS
- If GW meets AWQS, abandon non-retained wells
- Use a subset of retained wells as IMWs to monitor for later excursions into rinsed areas (and adjust operations as needed)

Comment 43/EPA Comment 4

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Closure/Post Closure Strategy (cont'd):

- After completion of all mining and rinsing (e.g. 23 years), monitor a subset of retained wells annually for 5 years to verify no rebound has occurred (note that Excelsior does not believe rebound is likely due to pH buffering and neutralization capacity of host rocks)
- If rebound above AWQS is observed, use retained wells for additional pumping and/or rinsing as needed
- If no AWQS exceedances after 5 years, abandon all wells and facilities including POC

1 in 10 Wells for First 10 Years

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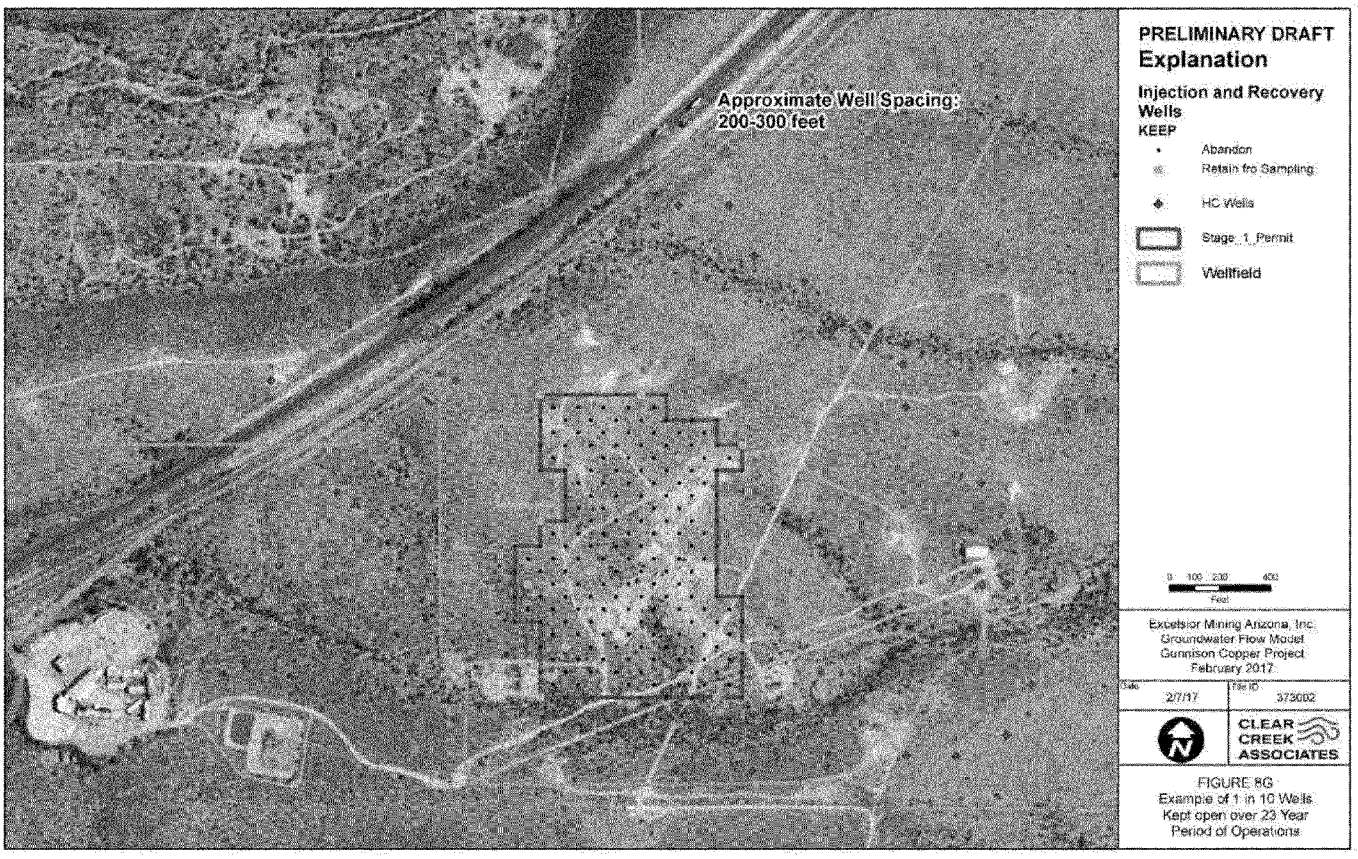

1 in 10 Wells for Life of Mine

Excelsior MINING CORP

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4. Other monitoring: 30-day rolling average for over-extraction to injection volume and use of intermediate monitoring wells.

Any additional technical issues from Excelsior's comment responses submitted Dec' 22, 2016?

AGENDA

- Next meeting February 23, 2017
- Are all comment response issues resolved?
- Can we move to draft permit conditions?

Backup Slides

Table of pump rates by stage

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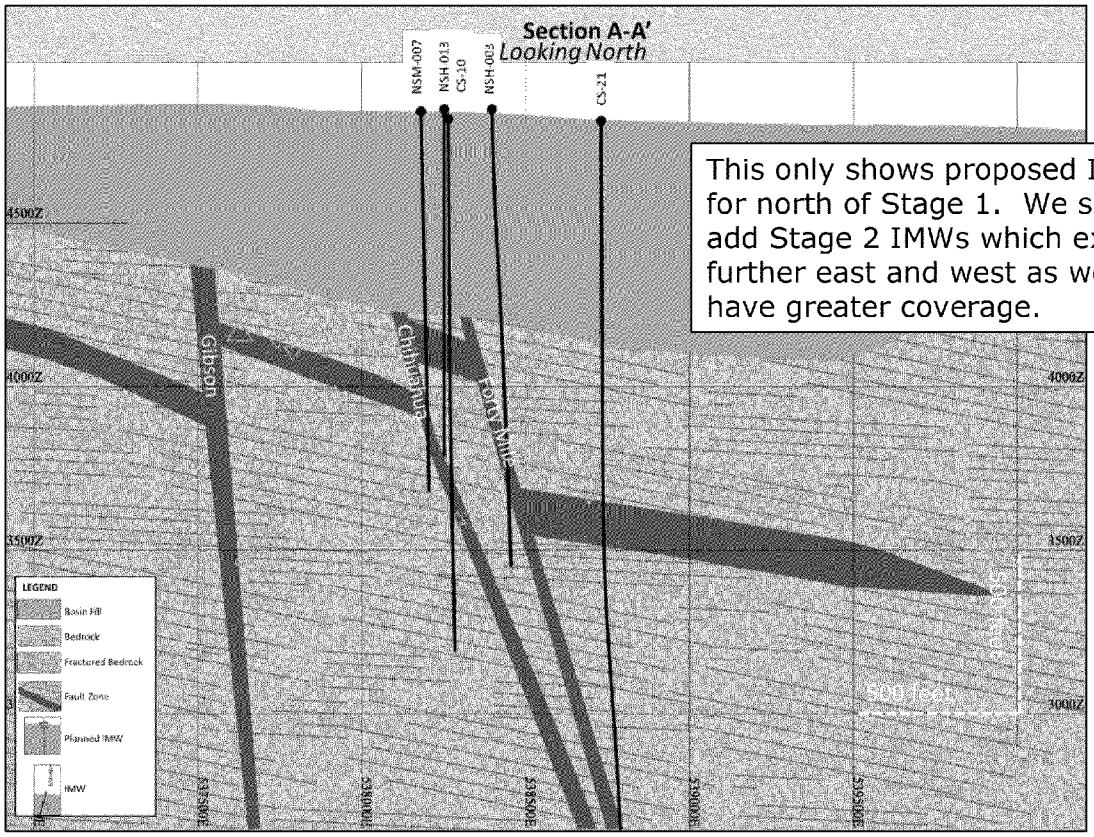
Stage 1				Stage 2				Stage 3				Post Production Rinsing			
Year	Average/Maximum Injection/Recovery GPM (Leaching/Rinsing/Conditioning)*	Hydraulic Control (gpm)	Net Pumping (gpm)	Year	Average/Maximum Injection/Recovery GPM (Leaching/Rinsing/Conditioning)	Hydraulic Control	Net Pumping	Year	Average/Maximum Injection/Recovery GPM (Leaching/Rinsing/Conditioning)	Hydraulic Control	Net Pumping	Year	Average/Maximum Injection/Recovery GPM (Leaching/Rinsing/Conditioning)	Hydraulic Control	Net Pumping
1	5,300 / 6,000	15	15	11	15,800/ 17000	125	125	14	25,600 / 28,000	155	155	21	850/ 1,400	191	191
2		45	45	12		125	125	15		160	160	22		191	191
3		45	45	13		125	125	16		125	125	23		123	123
4		50	50					17		175	175				
5		68	68					18		175	175				
6		82	82					19		191	191				
7		125	125					20		191	191				
8		125	125							191	191				
9		125	125							191	191				
10		125	125												
	AVERAGE		80				125				173				168

*injection approximately equal to recovery.

Cross Section A-A'



This only shows proposed IMWs for north of Stage 1. We should add Stage 2 IMWs which extend further east and west as we will have greater coverage.

Comment 12: Water Supply

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